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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/707,744	01/08/2004	Gary L. Sugar	COG-2-0977.02.US	1743

24374 7590 07/10/2008

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EXAMINER	
VUONG, QUOCHIEN B	
ART UNIT	**PAPER NUMBER**
2618	

MAIL DATE	DELIVERY MODE
07/10/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/707,744	SUGAR ET AL.	
	Examiner	Art Unit	
	Quochien B. Vuong	2618	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 April 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-22 and 26-29* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10,14,18,19 and 26-29* is/are rejected.

7)☒ Claim(s) *11-13,15-17, and 20-22* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

This action is in response to applicant's response filed on 04/11/2008. Claims 1-22 and 26-29 are now pending in the present application.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-7, 9, and 26-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ling et al. (US 7,006,848) in view of Matero (US 6,215,988).

Regarding claim 1, Ling et al. (figure 1; column 3, line 23 – column 6, line 24) disclose a multiple-input multiple-output (MIMO) radio transceiver on a single semiconductor integrated circuit (column 35, line 63 – column 36, line 3), comprising: a receiver comprising at least first and second receiver circuits each to process a signal from a corresponding one of first and second antennas, the first receiver circuit downconverts a first receive signal detected by the first antenna to produce a first baseband signal, the second receiver circuit downconverts a second receive signal detected by the second antenna to produce a second baseband signal (column 13, line 57 – column 14, line 7); a transmitter comprising at least first and second transmitter circuits, the first transmitter circuit upconverts a first baseband transmit signal to generate a first radio frequency signal that is coupled to the first antenna for

transmission, the second transmitter circuit upconverts a second baseband transmit signal to generate a second radio frequency signal that is coupled to the second antenna for transmission (figure 3; column 10, line 3 – column 11, line 33) (it is noted that the system 100 in figure 1 show the communication between first system 110 as a transmitter and a second system 150 as a receiver; however, both first and second systems are transceiver systems which can transmit and receive, for example the first system 110 has transmitter section including 112, 114, 120, and MOD 122a-122t, and receiver section including DEMOD 122a-122t and 132), a first amplifier that amplifiers the first radio frequency signal; a second amplifier that amplifies the second radio frequency signal, wherein the amplifiers are internal to the single semiconductor integrated circuit, and a first and second filters (column 8, lines 23-35). Ling et al. do not specifically disclose the first and second amplifiers are power amplifiers, and the first and second filters are lowpass filters. However, Matero (figure 3) disclose a first power amplifier (66) that amplifiers the first radio frequency signal; and a second power amplifier (84) that amplifies the second radio frequency signal, wherein the power amplifiers are internal to the circuitry (column 5, line 19 – column 6, line 5). Therefore, it would have been obvious for one having ordinary skill in the art at the time the invention was made to adapt the power amplifiers of Matero to the transceiver of Ling et al. for amplifying the signal before transmitting. And examiner takes Official notice that it is well known in the art to use lowpass filter in the transmitter circuitry. Therefore, it would have also been obvious to adapt the lowpass filters to the for the first and second filters

of Ling et al. and Matero in order to filter out the high frequency component for reducing noise in the transmitter section.

Regarding claim 2, Ling et al. and Matero disclose the radio transceiver of claim 1 above; in addition, Matero (figure 3) disclose a local oscillator (52) coupled to the receiver and to the transmitter, the local oscillator supplying a local oscillator signal to each of the first and second receiver circuits used for downconverting the first and second receive signals, respectively, and supplying a local oscillator signal to each of the first and second transmitter circuits used for upconverting the first and second baseband transmit signals, respectively, to a desired frequency for the first and second radio frequency signals, respectively (column 4, lines 27 – 60).

As to claim 3, Matero discloses wherein the first receiver circuit and the second receiver circuit process the first and second receive signals substantially simultaneously to allow for combining of signals resulting from processing by the first and second receiver circuits (column 4, lines 27 – 60).

As to claim 4, Matero discloses wherein the first transmitter circuit and the second transmitter circuit process the first and second baseband transmit signals for transmission of the corresponding first and second radio frequency signals substantially simultaneously (column 4, lines 27 – 60).

As to claim 5, Matero (figure 3) discloses a frequency synthesizer that produces a local oscillator signal that is coupled to each of the first and second receiver circuits to be mixed with the first and second receive signals, respectively, wherein the local oscillator signal may be at any frequency within one or more discrete radio frequency

bands to receive the first and second receive signals at a common frequency, and wherein the frequency synthesizer generates a local oscillator signal that is coupled to the first and second transmitters to upmix the first and second baseband transmit signals, respectively, for transmission of the corresponding first and second radio frequency signals at a common frequency within the one or more radio frequency bands (column 4, lines 27 – 60).

As to claims 6 and 7, Ling et al. disclose wherein the first and second receiver circuits comprise a single stage mixing process to downconvert the first and second receive signals directly to baseband or a two stage mixing process to downconvert the first and second receive signals to first and second intermediate frequency signals at a common intermediate frequency, and then to first and second baseband signals (column 13, line 57 – column 14, line 7).

As to claim 9, Matero (figure 3) disclose a first power amplifier (66) in the first transmitter circuit that amplifies the first radio frequency signal and a second power amplifier (84) in the second transmitter circuit that amplifies the second radio frequency signal (column 4, lines 27 – 60).

Regarding claim 26, Ling et al. (figure 1; column 3, line 23 – column 6, line 24) disclose method for radio communication comprising steps of: coupling first and second radio frequency signals detected by first and second antennas to first and second receiver circuits on an integrated circuit (column 35, line 63 – column 36, line 3); downconverting the first and second radio signals with the first and second receiver circuits to produce first and second baseband signals (column 13, line 57 – column 14,

line 7); coupling first and second baseband first and second transmitter circuits, integrated circuit; upconverting the first and second signals with the first and produce first and second transmit signals to respectively, on the baseband transmit second transmitter circuits to transmit radio frequency signals at a common center frequency; coupling the first and second transmit radio frequency signals to the first and second antennas, respectively, for simultaneous transmission (figure 3; column 10, line 3 – column 11, line 33), and filtering the first and second radio frequency signals using a first and second filter, respectively (column 8, lines 31-35). Ling et al. do not disclose from downconverting and upconverting from a common center frequency and amplifying the first radio frequency signal using a first power amplifier; and amplifying the second radio frequency signal using a second power amplifier, wherein the power amplifiers are internal or external to the single semiconductor integrated circuit; and wherein the the first and second filters are lowpass filter. However, Matero (figure 3) disclose the first and second receivers downconverting and the first and second transmitters upconverting from a common center frequency (column 4, lines 27 – 60, the same local oscillator signal going to mixers 60, 74, and 78); and amplifying the first radio frequency signal using a first power amplifier; and amplifying the second radio frequency signal using a second power amplifier, wherein the power amplifiers are internal or external to the single semiconductor integrated circuit (column 5, line 19 – column 6, line 5). Therefore, it would have been obvious for one having ordinary skill in the art at the time the invention was made to adapt the teaching of Matero to the transceiver of Ling et al. for compact design since using only a single local oscillator signal and amplifying the

signal before transmitting. And examiner takes Official notice that it is well known in the art to use lowpass filter in the transmitter circuitry. Therefore, it would have also been obvious to adapt the lowpass filters to the for the first and second filters of Ling et al. and Matero in order to filter out the high frequency component for reducing noise in the transmitter section.

Regarding claim 27, Ling et al. (figure 1; column 3, line 23 – column 6, line 24) disclose a radio transmitter integrated on a single semiconductor integrated circuit (column 35, line 63 – column 36, line 3), comprising at least first and second transmitter circuits that upconvert first and second baseband signals, respectively, for transmission substantially simultaneously (figure 3; column 10, line 3 – column 11, line 33); wherein the first transmitter circuit comprises a first amplifier; and wherein the second transmitter circuit comprises a second amplifier, and wherein an output power of the first amplifier and an output power of the second amplifier are reduced (column 8, lines 23-35); and a first and second filters (column 8, lines 23-35). Ling et al. do not specifically disclose the first and second amplifiers are power amplifiers; and wherein the first and second filters are lowpass filters. However, Matero (figure 3) disclose a first transmitter circuit comprises a first power amplifier (66); and wherein a second transmitter circuit comprises a second power amplifier (84), and wherein an output power of the first power amplifier and an output power of the second power amplifier are reduced (column 5, line 19 – column 6, line 5). Therefore, it would have been obvious for one having ordinary skill in the art at the time the invention was made to adapt the power amplifiers of Matero to the transceiver of Ling et al. for amplifying the signal before transmitting.

And examiner takes Official notice that it is well known in the art to use lowpass filter in the transmitter circuitry. Therefore, it would have also been obvious to adapt the lowpass filters to the for the first and second filters of Ling et al. and Matero in order to filter out the high frequency component for reducing noise in the transmitter section.

3. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ling et al. in view of Matero and further in view of Hasler et al. (US 5,606,736).

Regarding claim 8, Ling et al. and Matero disclose the radio transceiver of claim 7 above. Ling et al. and Matero do not specifically disclose a frequency synthesizer that supplies a radio frequency local oscillator signal and an intermediate frequency local oscillator signal to the first and second receiver circuits, wherein the intermediate frequency local oscillator signal is derived from the radio frequency local oscillator signal by a division ratio. However, Hasler et al. (figures 1 and 2) disclose a frequency synthesizer that supplies a radio frequency local oscillator signal and an intermediate frequency local oscillator signal to the first and second receiver circuits, wherein the intermediate frequency local oscillator signal is derived from the radio frequency local oscillator signal by a division ratio (column 2, line 58 – column 3, line 15). Therefore, it would have been obvious for one having ordinary skill in the art at the time the invention was made to adapt the frequency synthesizer of Hasler et al. to the transceiver of Ling et al. and Matero for compact design since using only a single frequency synthesizer.

4. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ling et al. in view of Matero and further in view of Yamaguchi et al. (US 5,966,666).

Regarding claim 10, Ling et al. and Matero disclose the radio transceiver of claim 1 above. Ling et al. and Matero do not specifically disclose wherein each of the first and second receiver circuits comprises a radio frequency mixer that down-mixes the first and second receive signals, respectively, to an intermediate frequency signal, and a pair of quad mixers that down-mix the intermediate frequency signal to in-phase and quadrature baseband signals. However, Yamaguchi et al. (figure 1) disclose each of the first and second receiver circuits comprises a radio frequency mixer (21, 22) that down-mixes the first and second receive signals, respectively, to an intermediate frequency signal, and a pair of quad mixers (27) that down-mix the intermediate frequency signal to in-phase and quadrature baseband signals (column 2, line 54 – column 3, line 50). Therefore, it would have been obvious for one having ordinary skill in the art at the time the invention was made to adapt the mixers of Yamaguchi to the transceiver of Ling et al. and Matero for processing the received signals.

5. Claims 14, 28, and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ling et al. in view of Matero and further in view of Heck (US 5,222,253).

As to claim 14, Ling et al. and Matero disclose the radio transceiver of claim 1 above. In addition, Matero (figure 3) discloses a first (42) and second (72) bandpass filters, the first and second bandpass filters filter the signals detected by the first and

second antenna, respectively, to produce the first and second receive signals (column 5, lines 19-25, and 41-58). Ling et al. and Matero do not explicitly disclose a first transmit/receive switch to be coupled to the first antenna and a second transmit/receive switch to be coupled to the second antenna, wherein the first and second transmit/receive switches each comprises an antenna terminal to be coupled to the first and second antenna, respectively, a receive output terminal and a transmit input terminal, the transmit input terminals of the first and second transmit/receive switches being coupled to the output of the first and second transmitter circuits, respectively, wherein the first and second transmit/receive switches are response to a control signal to select one of the two output terminals. However, Heck (figure 2) disclose a transmit/receive switch (48) to be coupled to an antenna (52), wherein the transmit/receive switch comprises an antenna terminal to be coupled to the antenna, a receive output terminal and a transmit input terminal, wherein the transmit/receive switch is response to a control signal (44) to select one of the two output terminals (column 3, lines 34-50). Therefore, it would have been obvious to adapt the transmit/receive switch of Heck to each branch of the transceiver of Ling et al. and Matero in order to switch the transmitter/receiver and reducing transient disturbances.

As to claim 28, Matero discloses the radio transceiver is a multi-band transceiver (figures 3-4; and column 4, lines 28-44).

As to claim 29, Matero discloses the transceiver operates in TDD, FDD, or HFDD mode (column 1, lines 13-25).

6. Claims 18 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ling et al. in view of Matero and further in view of Smith (US 5,444,864).

As to claim 18, Ling et al. and Matero disclose the radio transceiver of claim 1 above. Ling et al. and Matero do not disclose the radio front end section comprises a first diplexer to be coupled to the first antenna and a second diplexer to be coupled to the second antenna, wherein the first and second diplexers each have first and second branches onto which signals from the first and second radio frequency bands, respectively, are coupled for transmission via the first and second antennas, respectively, or are coupled when received by the first and second antenna, respectively. However, Smith (figure 1) disclose a radio front end section comprises a diplexer to be coupled to an antenna (26), wherein the diplexer has first (18) and second (20) branches onto which signal is coupled for transmission via the antennas, or is coupled when received by the antenna (column 2, lines 13-27). Therefore, it would have been obvious to adapt the diplexer of Smith to each antenna of the transceiver of Ling et al. and Matero in order to switch the antenna to the transmitter for transmitting and to the receiver for receiving signal.

Allowable Subject Matter

7. Claims 11-13, 16, 17, 21, and 22 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

8. Applicant's arguments filed 04/11/2008 have been fully considered but they are not persuasive.

Applicant argues that Ling et al. and Matero fail to disclose a first and second lowpass filters. The examiner, however, does not agree with the Applicant. Ling et al. disclose a first and second filters (figure 1, modulator 122a-t; and column 8, lines 23-35) and the fact that it is well known in the art to use lowpass filter in transmitter section.

Conclusion

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Quochien B. Vuong whose telephone number is (571) 272-7902. The examiner can normally be reached on M-F 9:30-18:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nay Maung can be reached on (571) 272-7882. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Quochien B Vuong/
Primary Examiner, Art Unit 2618